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Sandvik Tamrock Oy

UNITED STATES DISTRICT COURT

DISTRICT

CV-S-00-0443-JBR-RLH

SANDVIK TAMROCK OY, Plaintiff, vs. EQUIPOS MINEROS S.A.; TIMBEROCK INNOVATIONS; and F&H MINE SUPPLY, INC., Defendants.	**SANDVIK TAMROCK'S COMPLAINT FOR PATENT INFRINGEMENT, TRADEMARK AND TRADE DRESS INFRINGEMENT** **JURY DEMANDED**

Plaintiff, Sandvik Tamrock Oy ("Sandvik Tamrock"), complains of Defendants, Equipos Mineros, S.A., Timberock Innovations, and F&H Mine Supply, as follows.

JURISDICTION AND VENUE

1. This Action arises under the Patent Laws of the United States as set forth in 35 U.S.C. § 101 *et seq.*, and under the Trademark Laws of the United States as set forth in 15 U.S.C. § 1051 *et seq.*

2. This Court has jurisdiction pursuant to 15 U.S.C § 1121, 28 U.S.C. § 1338(a) and, 28 U.S.C. § 1331. Venue is proper under 28 U.S.C. § 1391(b)-(d) and/or 28 U.S.C. § 1400(a)-(b).

I

THE PARTIES

3. Plaintiff, Sandvik Tamrock Oy ("Sandvik Tamrock") is a corporation organized under the laws of Finland, and has a principal place of business in Tampere, Finland.

4. Upon information and belief, Defendant Equipos Mineros, S.A. ("Equipos") is a corporation organized and existing under the laws of Chile and has a principal place of business at Colon 2005 Vivaceta, P.O. Box 1063, Santiago, Chile.

5. Defendant Equipos has been transacting business in this judicial district though offers to sell and, upon information and belief, selling products in this judicial district.

6. Upon information and belief, Defendant Timberock Innovations ("Timberock") is a corporation organized under the laws of Canada, and has a principal place of business at 1-B Roger Lane, Elliot Lake, Ontario, Canada P5A 2T1.

7. Upon information and belief, Defendant Timberock has been transacting business in this judicial district by offering to sell and selling products in this judicial district.

8. Upon information and belief, Defendant F&H Mine Supply ("F&H") is a corporation organized and existing under the laws of Idaho and has a principal place of business at 1016 East Mullen Road, Osburn, Idaho 83849.

9. Upon information and belief, F&H is a U.S. distributor for products of Defendant Equipos.

10. Upon information and belief, F&H is a U.S. distributor for products of Defendant Timberock.

11. Upon information and belief, F&H is doing business in this judicial district at addresses including 1140 Chukar Lane,

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Battle Mountain, Nevada 89820-2373, and 208 E Cedar St # B, Beatty, NV 89003.

12. Upon information and belief, F&H has transacted business in this judicial district by offering to sell and selling products within this judicial district.

COUNT I -- PATENT INFRINGEMENT
IN VIOLATION OF 35 U.S.C. § 271

13. The allegations contained in paragraphs 1 through 13 are incorporated by reference as though fully set forth herein.

14. On June 27, 1989, United States Letters Patent 4,842,080 (hereinafter, "the '080 patent") duly and legally issued to Oy Tampella AB on an invention entitled "Arrangement for Mounting of a Rotation Element in a Drilling Machine". A copy of the '080 patent is appended hereto as Exhibit A.

15. In 1997, Oy Tampella AB changed its corporate name to Tamrock Oy. In 1999, Tamrock Oy changed its corporate name to Sandvik Tamrock Oy. At all times, Sandvik Tamrock, through its predecessor companies, has been and is still the owner of the entire right, title and interest in the '080 patent.

16. The '080 is presumptively valid and enforceable under 35 U.S.C. § 282.

17. On July 11, 1989, United States Letters Patent 4,846,289 (hereinafter, "the '289 patent") duly and legally issued to Oy Tampella AB on an invention entitled "Arrangement for Supporting of an Axial Bearing of a Drilling Machine". A copy of the '289 patent is appended hereto as Exhibit B.

18. In 1997, Oy Tampella AB changed its corporate name to Tamrock Oy. In 1999, Tamrock Oy changed its corporate name to

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Sandvik Tamrock Oy. At all times, Sandvik Tamrock, through its predecessor companies, has been and is still the owner of the entire right, title and interest in the '289 patent.

19. The '289 patent is presumptively valid and enforceable under 35 U.S.C. § 282.

20. Defendant Equipos exhibited at a mining industry trade show in Las Vegas, Nevada, in 1999.

21. At the trade show, Defendant Equipos distributed literature offering for sale devices that infringe one or more claims of the '080 patent and the '289 patent. Copies of the literature distributed at the trade show are attached as Exhibit C.

22. Defendant Equipos has infringed the claims of the '080 patent and the '289 patent by offering to sell within the United States infringing devices, without license or authority from Sandvik Tamrock, and will continue to do so unless enjoined by this Court.

23. Upon information and belief, Defendant Equipos has contributed to the infringement of the `080 and `289 patents by offering to sell or selling within the United States or importing into the United States components of patented machines, manufactures, combinations or compositions constituting material parts of the inventions of the `080 and `289 patents, knowing the same to be especially made or especially adapted for use in an infringement of such patents, and not a staple article or commodity of commerce suitable for substantial noninfringing use.

24. Upon information and belief, Defendant Timberock has infringed the claims of the '080 patent and the '289 patent by

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offering to sell within the United States devices manufactured by Defendant Equipos, which infringe one or more claims of the '080 patent and the '289 patent, and will continue to do so unless enjoined by this Court.

25. Upon information and belief, Defendant Timberock has contributed to the infringement of the `080 and `289 patents by offering to sell or selling within the United States or importing into the United States components of patented machines, manufactures, combinations or compositions constituting material parts of the inventions of the `080 and `289 patents, knowing the same to be especially made or especially adapted for use in an infringement of such patents, and not a staple article or commodity of commerce suitable for substantial noninfringing use.

26. Upon information and belief, Defendant F&H has infringed claims of the '080 patent and the '289 patent by offering to sell within the United States devices manufactured by Defendant Equipos, which infringe one or more claims of the '080 patent and the '289 patent, and will continue to do so unless enjoined by this Court.

27. Upon information and belief, Defendant F&H has contributed to the infringement of the `080 and `289 patents by offering to sell or selling within the United States or importing into the United States components of patented machines, manufactures, combinations or compositions constituting material parts of the inventions of the `080 and `289 patents, knowing the same to be especially made or especially adapted for use in an infringement of such patents, and not a staple article or commodity of commerce suitable for substantial noninfringing use.

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28. Upon information and belief, Defendant Timberock is reconstructing Sandvik Tamrock equipment covered by one or more claims of the `080 and `289 patents, and selling, offering to sell within the United States, and/or importing into the U.S. such reconstructed Sandvik Tamrock equipment, thereby infringing one or more claims of the '080 patent and the '289 patent, and will continue to do so unless enjoined by this Court.

29. Upon information and belief, Defendant F&H is selling, offering to sell within the United States, and/or importing into the U.S. reconstructed Sandvik Tamrock equipment covered by one or more claims of the `080 and `289 patents, thereby infringing one or more claims of the '080 patent and the '289 patent, and will continue to do so unless enjoined by this Court.

30. The infringement of the '080 patent and the '289 patent by the Defendant Equipos has and will deprive Sandvik Tamrock of sales and profits which Sandvik Tamrock would have made and will enjoy in the future and/or has in other respects injured Sandvik Tamrock and will continue to cause Sandvik Tamrock added irreparable and other injury and damage including loss of profits in the future unless the Defendant Equipos is enjoined from infringing the '080 patent and the '289 patent.

31. The infringement of the '080 patent and the '289 patent by the Defendant Timberock has and will deprive Sandvik Tamrock of sales and profits which Sandvik Tamrock would have made and will enjoy in the future and/or has in other respects injured Sandvik Tamrock and will continue to cause Sandvik Tamrock added irreparable and other injury and damage including loss of profits

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in the future unless the Defendant Timberock is enjoined from infringing the '080 patent and the '289 patent.

32. The infringement of the '080 patent and the '289 patent by the Defendant F&H has and will deprive Sandvik Tamrock of sales and profits which Sandvik Tamrock would have made and will enjoy in the future and/or has in other respects injured Sandvik Tamrock and will continue to cause Sandvik Tamrock added irreparable and other injury and damage including loss of profits in the future unless the Defendant F&H is enjoined from infringing the '080 patent and the '289 patent.

33. Defendants Equipos and Timberock are identified as exhibitors at the MINExop 2000 mining industry trade show scheduled to take place October 9-12, 2000, in Las Vegas, Nevada.

34. Upon information and belief, if not enjoined before October 9, 2000, Defendants Equipos and Timberock will offer for sale products infringing the `080 and `289 patents at the MINExpo 2000 event, thereby causing Sandvik Tamrock irreparable and other injury.

COUNT II , TRADEMARK INFRINGEMENT
IN VIOLATION OF 15 U.S.C. § 1114 AND 1125(a)

35. The allegations contained in paragraphs 1 through 34 are incorporated by reference as though fully set forth herein.

36. Sandvik Tamrock is the owner of U.S. Trademark Registration No. 935,320 for TAMROCK for rock drilling machines and parts thereof. A copy of U.S. Trademark Registration No. 935,320 is attached as Exhibit D.

37. Defendant Equipos, without the consent of Sandvik Tamrock, has distributed advertisements within the United States

that state that Defendant Equipos manufactures rock drills and spare parts under the TAMROCK mark, falsely representing that Defendant Equipos is an authorized dealer of rock drills and spare parts bearing the TAMROCK mark, which it is not.

38. Defendant Equipos' acts as set forth above constitute trademark infringement and a false designation of origin in that the unauthorized use of the TAMROCK mark will damage Sandvik Tamrock's business by causing a likelihood of confusion as to the source of origin of the goods to the purchasing market. Buyers of Defendant Equipos' goods, as well as customers of plaintiff's goods, are likely to believe that Sandvik Tamrock is associated with and/or endorses and authorizes the manufacture of Defendant Equipos' goods, which plaintiff does not.

39. By reason of Defendant Equipos' acts constituting trademark infringement and false designation of origin, Sandvik Tamrock has sustained, and will continue to sustain substantial irreparable and other injury, loss, and damage to its rights under its TAMROCK trademark unless Defendant Equipos is enjoined from infringing the trademark.

40. Upon information and belief, Defendants Timberock and F&H, on behalf of Timberock, without the consent of Sandvik Tamrock, have distributed advertisements within the United States that state that Defendant Timberock manufactures rock drills and spare parts under the TAMROCK mark, falsely representing that Defendants Timberock and F&H are authorized dealers of rock drills and spare parts bearing the TAMROCK mark, which they are not.

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41. Defendants Timberock's and F&H's acts as set forth above constitute trademark infringement and a false designation of origin in that the unauthorized use of the TAMROCK mark will damage Sandvik Tamrock's business by causing a likelihood of confusion as to the source of origin of the goods to the purchasing market. Buyers of Defendant Timberock's goods, as well as customers of plaintiff's goods, are likely to believe that Sandvik Tamrock is associated with and/or endorses and authorizes the manufacture of Defendant Timberock's goods, which plaintiff does not.

42. By reason of Defendant Timberock's acts constituting trademark infringement and false designation of origin, Sandvik Tamrock has sustained, and will continue to sustain substantial irreparable and other injury, loss, and damage to its rights under its TAMROCK trademark unless Defendants Timberock and F&H are enjoined from infringing the trademark.

COUNT III , TRADE DRESS INFRINGEMENT
IN VIOLATION OF 15 U.S.C. § 1125(a)

43. The allegations contained in paragraphs 1 through 42 are incorporated by reference as though fully set forth herein.

44. Sandvik Tamrock makes and sells equipment used for mining under the registered trademark TAMROCK, including hydraulic rock drill model series HL 300, HL 500, and HL 600 rock drills and spare parts therefor, under the mark TAMROCK. The shape of the products is distinctive and has acquired secondary meaning.

45. Defendant Equipos has advertised, displayed, and offered for sale in the United States hydraulic rock drills

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having shapes nearly identical to the shapes of at least the TAMROCK hydraulic rock drill model series HL 300, HL 500, and HL 600 rock drills and spare parts.

46. Defendant Equipos' acts as set forth above constitute trade dress infringement in that the unauthorized use of the distinctive trade dress of at least the TAMROCK hydraulic rock drill models HL 300, HL 500, and HL 600 rock drills and spare parts and will irreparably damage Sandvik Tamrock's business by causing a likelihood of confusion as to the source of origin of the goods to the purchasing market where, in fact, Sandvik Tamrock has no control over the quality of Equipos' products. Buyers of Defendant Equipos' products, as well as customers of plaintiff's goods, are likely to believe that Sandvik Tamrock is associated with and/or endorses and authorizes the manufacture of Defendant's goods, which plaintiff does not.

WHEREFORE, Plaintiff prays for judgment that:

A. Defendants Equipos, Timberock, and F&H have infringed and are infringing one or more claims of United States Patent No. 4,846,289 and United States Patent No. 4,842,080;

B. The infringement by the Defendants Equipos, Timberock, and F&H of United States Patent No. 4,846, 289 and United States Patent No. 4,842,080 is willful;

C. Defendants Equipos, Timberock, and F&H, and its officers, agents, servants and employees, and those in active concert or participation with any of them, be preliminarily during the pendency of this action, and permanently thereafter, enjoined and restrained from further infringement of United

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States Patent No. 4,846, 289 and United States Patent No. 4,842,080;

D. Sandvik Tamrock be awarded damages sufficient to compensate it for the infringement of United States Patent No. 4,846, 289 and United States Patent No. 4,842,080 and that such damage be trebled and awarded to Sandvik with prejudgment interest;

E. Defendants Equipos, Timberock, and F&H be found to have engaged in conduct that violates 15 U.S.C. § 1114 and 1125(a);

F. Defendants Equipos, Timberock, and F&H, their officers, agents, servants and employees, and those in active concert or participation with any of them, be preliminarily during the pendency of this action, and permanently thereafter, enjoined and restrained from unlawfully using the TAMROCK mark, and/or any other confusingly similar mark;

G. Defendant Equipos, its officers, agents, servants and employees, and those in active concert or participation with any of them, be preliminarily during the pendency of this action, and permanently thereafter, enjoined and restrained from unlawfully using the trade dress of at least the TAMROCK hydraulic rock drill model series HL 300, HL 500, and HL 600 rock drills and spare parts, or any other confusingly similar trade dress;

H. Sandvik Tamrock be awarded its attorneys' fees, costs and expenses in this action; and

I. Sandvik be awarded such further relief as the Court deems just.

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REQUEST FOR JURY TRIAL

SANDVIK TAMROCK hereby demands a trial by jury pursuant to Rule 38 of the Federal Rules of Civil Procedure as to all issues in this lawsuit.

Respectfully submitted this 6th day of April, 2000.

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Alexandria, Virginia 22313-1404
Telephone: (703) 836-6620

EXHIBIT A

United States Patent [19]
Heinonen

[11] **Patent Number:** 4,842,080
[45] **Date of Patent:** Jun. 27, 1989

[54] **ARRANGEMENT FOR MOUNTING OF A ROTATION ELEMENT IN A DRILLING MACHINE**

[75] Inventor: Jarmo Heinonen, Tampere, Finland

[73] Assignee: Oy Tampella AB, Tampere, Finland

[21] Appl. No.: 43,841

[22] Filed: Apr. 28, 1987

[30] **Foreign Application Priority Data**

May 9, 1986 [FI] Finland 861941

[51] Int. Cl.[4] B23B 45/16
[52] U.S. Cl. 173/105
[58] Field of Search 173/105, 104, 109, 111; 74/434

[56] **References Cited**

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4,157,121 6/1979 Antsberg et al. .... 173/105 X
4,206,820 6/1980 Bailey et al. 173/105

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0035005 2/1980 European Pat. Off. .
1507605 4/1978 United Kingdom .

OTHER PUBLICATIONS

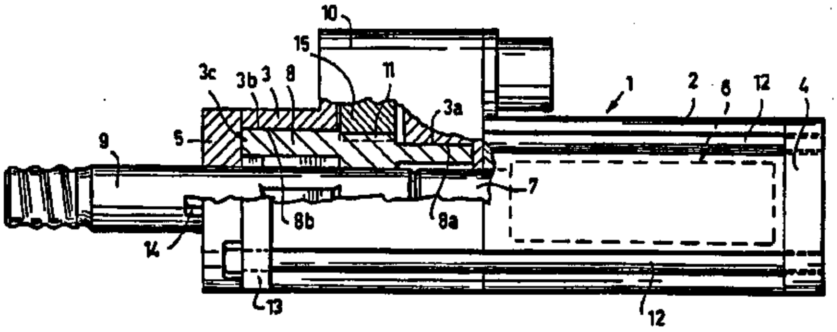
U.S. Ser. No. 517,779.

Primary Examiner—Frank T. Yost
Assistant Examiner—Willmon Fridie, Jr.
Attorney, Agent, or Firm—Ladas & Parry

[57] **ABSTRACT**

An arrangement for mounting of a rotation element in a drilling machine comprising a body (1) and a rotation element (8) mounted by means of bearing surfaces (8*a*, 8*b*) rotatably in the body for rotation of a drill shank (9). The rotation element is rotated by a rotation machinery (10) in engagement with a gear ring (11) of the rotation provided in the rotation element between the bearing surfaces. In order to replace the rotation element without having to disassemble the body, the rotation element is mounted at both ends thereof in the radial direction in an integral body part (3), and the bearing surfaces and the gear ring are arranged in a stepped manner so that the rotation element is removable from the integral body part axially through one end (3*c*) thereof.

3 Claims, 1 Drawing Sheet



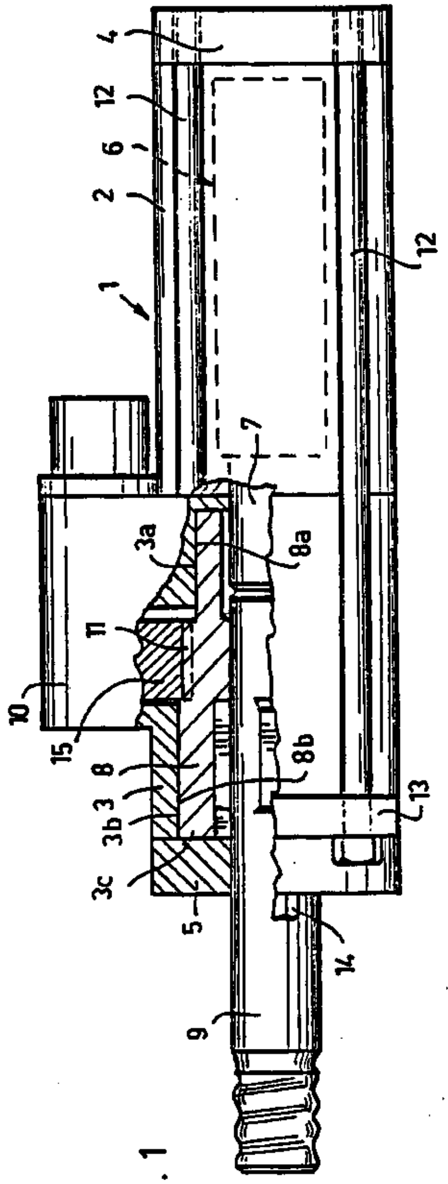

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FIG. 1

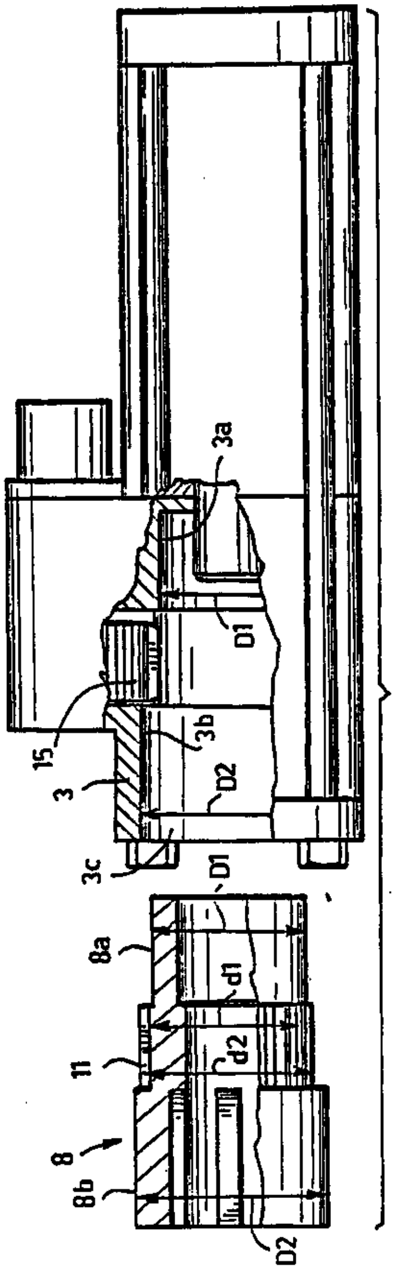
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FIG. 2

ARRANGEMENT FOR MOUNTING OF A ROTATION ELEMENT IN A DRILLING MACHINE

This invention relates to an arrangement for mounting of a rotation element in a drilling machine comprising a body and a percussion means mounted therein, a rotation element mounted rotatably in the body as an axial extension of the percussion means, and a rotation machinery supported by the body, which rotation machinery is in rotational engagement with the rotation element.

The term "rotation piece" as used herein refers both to a frame bushing used for rotation of a shank portion formed at the end of a drill rod and to a rotation bushing used for rotation of a special drill shank to be fastened to a drill rod.

In conventional hydraulic percussion drilling machines a percussion means mounted in the body is intended to direct successive axial percussions on a drill shank simultaneously as the shank is being rotated by means of a rotation element. For this purpose the rotation element is mounted rotatably in a supporting housing provided in the body.

In known drilling machine constructions the rotation element is mounted in two or more body parts, so that the supporting housing comprises at least two parts. the supporting housing comprises at least two parts. These body parts and the other parts of the body are interconnected by tie rods to form an rigid unit. It is common practice in mechanical engineering to position one of two bearings of a rotating shaft in a detachable part when a gear ring, for instance, is positioned between the two bearings of the shaft.

However, the known construction has the major disadvantage that the tie rods of the body parts have to be opened for replacement of the rotation element. In addition, the accuracy of the mounting of the rotation element is not the best possible since the bearings are positioned in two separate body parts.

The object of the present invention is to provide an arrangement for mounting of a rotation element, which arrangement avoids the above disadvantages and enables the rotation element to be replaced in a simpler manner. This object is achieved by means of the arrangement according to the invention which is characterized in that the rotation element is at both ends thereof mounted in the radial direction in an integral body part, and that bearing surfaces of the rotation element and a gear ring provided therebetween are arranged in a stepped manner so that the rotation element is removeable from said body part axially through one end thereof.

The invention is based on the idea that the bearing arrangement between the rotation element and the supporting housing is so shaped that the rotation element can be detached from an integral body part without having to disassemble the bearing surfaces provided in the supporting housing. By virtue of the integral body part the sideward forces acting on the shank can be transmitted through the rotation element to one rigid body part. The rotation element can be checked and serviced rapidly, since the integral rotation element can be drawn axially out of the supporting housing through one end thereof without having to disassemble the supporting housing. The detachment of the rotation element from the body does not, either, require an opening of the tie rods of the body, because it is not necessary to disassemble the body into separate parts.

The invention will be described in more detail in the following with reference to the attached drawing, wherein

FIG. 1 illustrates schematically a drilling machine provided with an arrangement according to the invention as a partial axial section in a side view, and

FIG. 2 illustrates a rotation element and a body as disassembled.

The drilling, machine shown in the drawing comprises a body 1 comprising a rearward body part 2 and a forward body part 3 and end covers 4, 5. A percussion means 6 is mounted in the rearward body part, and the percussion means is provided with a percussion piston 7. A rotation bushing 8 is mounted rotatably in the forward body part, and a shank 9 is mounted unrotatably but axially slideably within the rotation bushing coaxially with the percussion piston. The body supports a rotation machinery 10, which is in rotational engagement with a gear ring 11 provided on the outer surface of the rotation bushing. The body is assembled into a rigid unit by means of longitudinal tie rods 12 which extend from lugs 13 provided at the front end of the forward body part to the rear cover 4. The front cover is attached to the body part 3 by means of fastening screws 14 of its own.

The forward body part forms a supporting housing for the rotation bushing and it is provided with axially spaced bearing surfaces 3*a* and 3*b* which function as slide bearings for bearing surfaces 8*a* and 8*b* respectively provided at both ends of the rotation bushing. The bearing surfaces of the rotation bushing are positioned on opposite sides of the gear ring.

According to the invention both bearing surfaces and the gear ring of the rotation bushing are stepped in such a manner that the diameter D1 of the inner bearing surface 8*a* is smaller than or at the most equal to the inner diameter d1 of the gear ring, and the diameter D2 of the outer bearing surface is at least equal to or larger than the outer diameter d2 of the gear ring. By virtue of such a stepping the rotation bushing can be removed from the body part through a front opening 3*c* thereof without having to disassemble a drive gear 15 of the rotation machinery. Only the front cover 5 has to be opened for replacement of the rotation bushing; the tie rods need not be opened.

It is further noted that the body part 3 acting as a supporting housing is formed by an integral piece, on account of which the supporting housing is rigid and the mounting is accurate.

The drawing and the description related thereto are only intended to illustrate the idea of the invention. In its details the arrangement may vary within the scope of the claims.

I claim:

1. A mounting for a rotation element in a drilling machine comprising:

a body having an end cover removably fastened to the body by fastening means;

percussion means mounted within said body;

a rotation element mounted rotatably with said body in an integral body part in axial alignment with said percussion means;

rotation means supported by the body and in rotational engagement with a gear ring on said rotation element for rotating said rotation element;

first and second bearing surfaces on said rotation element, said first bearing surface being located on a side of said rotation element nearest said percussion means, said second bearing surface being located on a side of said rotation element nearest said end cover, said first bearing surface, said gear ring and said second bearing surface being arranged in a stepped manner whereby said rotation element is axially removable from said body part by removing only said end cover.

2. The mounting according to claim 1 wherein a diameter of said first bearing surface is not greater than

an inner diameter of said gear ring and a diameter of said second bearing surface is not less than an outer diameter of said gear ring.

3. The mounting according to claim 2 wherein said body comprises separate body parts interconnected by means of tie rods, said end cover being attached to said integral body part.

* * * * *

United States Patent [19]
Heinonen

[11] Patent Number: 4,846,289
[45] Date of Patent: Jul. 11, 1989

[54] ARRANGEMENT FOR SUPPORTING OF AN AXIAL BEARING OF A DRILLING MACHINE

[75] Inventor: Jarmo Heinonen, Tampere, Finland
[73] Assignee: Oy Tampella AB, Tampere, Finland

[21] Appl. No.: 40,944
[22] Filed: Apr. 21, 1987
[30] Foreign Application Priority Data
May 9, 1986 [FI] Finland 861939
[51] Int. Cl.[4] E21B 6/00
[52] U.S. Cl. 173/162.1; 173/105
[58] Field of Search 173/104, 105, 31, 38, 173/162.1

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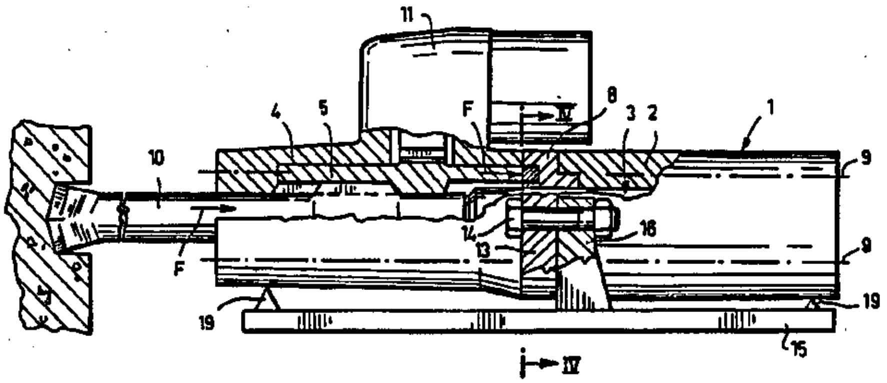
3,858,666 1/1975 Bailey et al. 173/105
FOREIGN PATENT DOCUMENTS
0899902 1/1982 U.S.S.R. 173/104

Primary Examiner—Frank T. Yost
Assistant Examiner—James L. Wolfe
Attorney, Agent, or Firm—Ladas & Parry

[57] ABSTRACT

An arrangement for supporting of an axial bearing of a drilling machine which comprises a body (1) supported by a carriage (15) and a rotation bushing (5) mounting rotatably in the body for rotation of a shank (10). An axial bearing (8) is arranged in the body for receiving axial forces (F) acting on the body through the shank. In order to release the body from strains caused by the axial forces of the shank, the axial bearing is supported on the carriage by a supporting device (16) for transmitting of the axial forces from the axial bearing directly to the carriage.

6 Claims, 2 Drawing Sheets



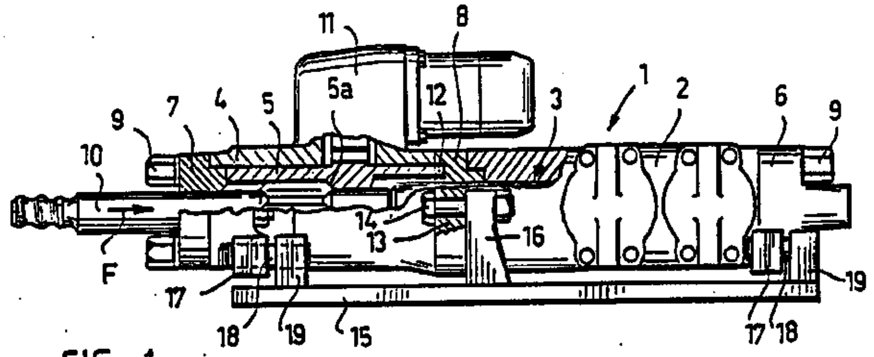

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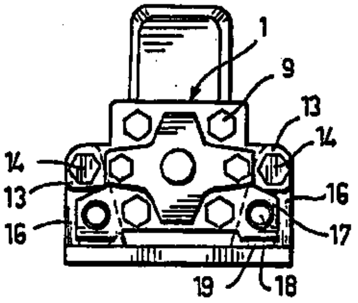
FIG. 1

FIG. 2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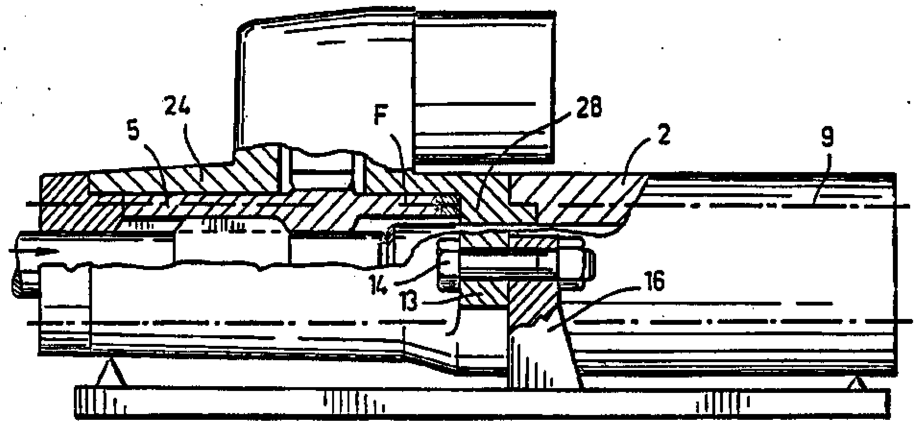
24
5
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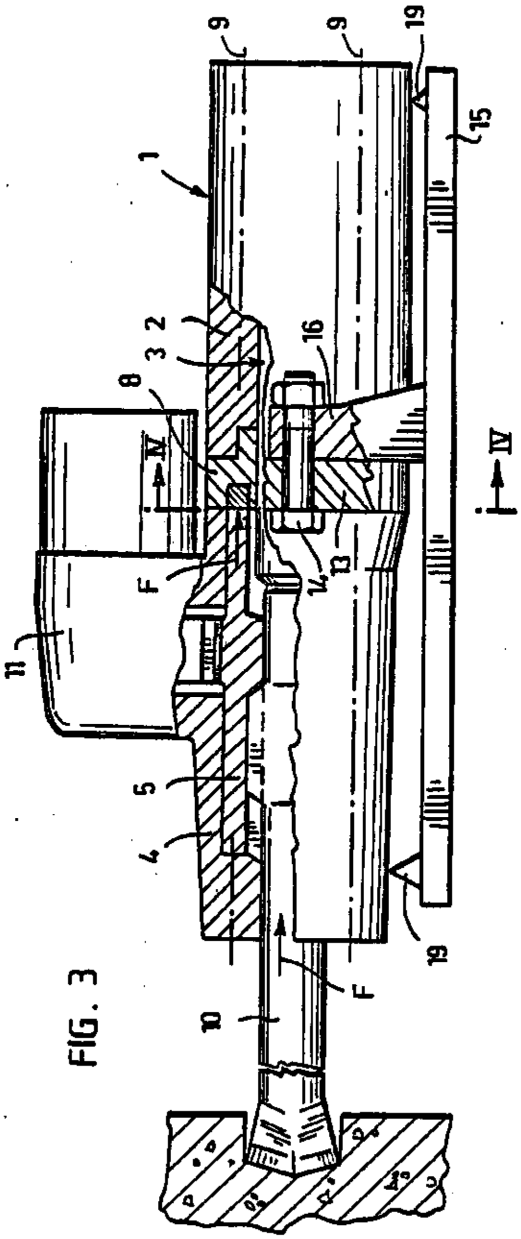
16

FIG. 5


9
9
19
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IV
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10
F

FIG. 3

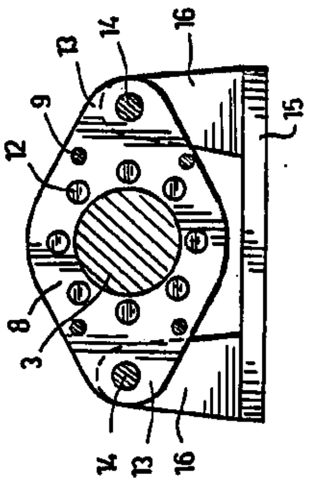
13
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FIG. 4

ARRANGEMENT FOR SUPPORTING OF AN AXIAL BEARING OF A DRILLING MACHINE

This invention relates to an arrangement for supporting of an axial bearing of a drilling machine comprising

a body supported by a carriage,

a percussion means mounted in the body and a rotation means positioned on an axial extension of the percussion means for rotation of a shank, and

an axial bearing arranged in the body for receiving axial forces acting on the body through the shank.

In conventional hydraulic percussion drilling machines, a percussion means mounted in the body is intended to direct successive axial percussions on a shank intended to be fastened to a drill rod. The shank is mounted rotatably and axially slideably in the body by means of a rotation bushing which is in engagement with a rotation machinery supported by the body. The body, in turn, is supported by and fastened to a feeding carriage on which the drilling machine is displaceable along a feeding beam of the drilling equipment.

In rock drilling a percussion impulse is reflected from the rock to the drilling machine, and the reflection force created by the impulse has to be received in some way in the drilling machine. The same applies to the counter force caused by the forward feeding of the drilling machine.

In a known rock drilling machine the feeding force and the forces reflected from the rock are received by means of an axial bearing which is supported by a separate gear housing or by the body and against which the rotation bushing is pressed by the shank during rock drilling. The percussion impulse reflected from the rock passes through the drill rods, the shank and the rotation bushing to the axial bearing and causes vibration. When the body of the drilling machine is assembled of separate body elements which are mounted axially one after another and connected together by means of tie rods, and, further, when the body is fastened to the feeding carriage at the front and rear ends of the body, this vibration is transmitted from the axial bearing to the other elements of the body before the forces causing the vibration are received in the carriage through the front and rear portions of the body. Such a vibration of the body elements exposes the connecting surfaces of the body elements to wear and cavitation and puts the tie rods interconnecting the body elements under a heavy stress.

In another known drilling machine the feeding force and the reflection forces are received by means of a hydraulic system by using a hydraulic piston. A liquid cushion communicating with the hydraulic system of the drilling machine is thereby provided between the body and a special damping piston against which the shank strikes under the influence of the reflection force. However, the powerful high-frequency percussion impulse reflected from the rock strains greatly the seals of the damping piston which are very soon damaged in use. The reflection impulses also cause great pressure variations in the hydraulic system communicating with the piston, and these pressure variations strain with pressure accumulators and interfere with the percussion dynamics of the drilling machine.

The object of this invention is to provide an arrangement which avoids the above disadvantages and by means of which the effects of the reflection impulses, which act on the axial bearing, on the body of the drilling machine can be essentially reduced. This object is achieved by means of an arrangement according to the invention which is characterized in that the axial bearing is supported directly on the carriage by supporting means separate from other support means of the body.

The invention is based on the idea that the axial bearing is supported in such a manner that the feeding and reflection forces acting thereon are transmitted from the axial bearing directly to the feeding carriage so that they are not transmitted through the other elements of the body. Consequently, the feeding and reflection forces do not strain the other body elements or the tie rods, nor do they interfere with the percussion dynamics of the drilling machine. The wear of the connecting surfaces between the body elements is reduced and the tie rods have a longer service life.

The invention will be described in the following in more detail with reference to the attached drawing, wherein

FIG. 1 is a partial axial section of a percussion drilling machine provided with an arrangement according to the invention in a side view,

FIG. 2 is a front view of the drilling machine,

FIG. 3 is a schematical view of the operating principle of the arrangement shown in FIG. 1,

FIG. 4 illustrates an axial bearing in a section along the line VI—VI in FIG. 3, and

FIG. 5 illustrates an alternative embodiment of the arrangement similarly as in FIG. 3.

The drilling machine shown in FIGS. 1 and 2 of the drawings comprises a body 1 which is formed by a rear element 2 in which a percussion means 3 is mounted; a front element 4 in which a rotation bushing 5 is mounted coaxially with the percussion means; an end cover 6; and a front cover 7. An axial bearing 8 according to the invention is positioned between the rear and the front element of the body. The axial bearing and the abovementioned body elements are assembled into a rigid unit by means of longitudinal tie rods 9. A shank 10 is arranged in the rotation bushing axially slideably but unrotatably. The shank is intended to be fastened to a drill rod. The body supports a rotation machinery 11 which is in engagement with the rotation bushing.

In this embodiment the axial bearing is formed by a separate annular piece, the front surface of which is provided with fixed bearing studs 12 which are arranged around the central opening of the axial bearing. The bearing studs are positioned opposite to the rear end of the rotation bushing.

The axial bearing is provided with fastening lugs 13 which are attached by means of bolts 14 to supports 16 fastened to a carriage 15. The supporting surface between the lugs and the supports is positioned in a plane transverse to the axis of the drilling machine, so that the supports bear the body and support it in the axial direction. The front and the rear end of the body are further provided with auxiliary lugs 17 which are supported by means of axial supporting pins 18 on auxiliary supports 19 provided in the carriage, so that they support the body in the radial direction.

The axial bearing of the drilling machine operates in the following way:

When the shank is displaced axially inwards within the rotation bushing under the influence of the feeding force and the reflection forces and bears on a shoulder 5a of the rotation bushing by means of its cogging, the rear end of the rotation bushing strikes axially against the bearing studs. Since the axial bearing is rigidly supported on the carriage, the feeding and reflection forces F exerted on the axial bearing are passed directly to the carriage from the axial bearing. Consequently, the body elements are not strained by these forces, because the forces are not transmitted through the other body elements to the carriage, but they are received in the carriage solely through the axial bearing 8 and the supports 16 of the carriage.

The embodiment shown in FIG. 5 differs from the preceding one mainly with respect to an axial bearing 28 which is integral with a forward body element 24 and is formed at the rear end thereof. The rear end of the body element is provided with fastening lugs 13 from which the axial bearing formed by the body portion is fastened to the carriage.

The drawings and the description related thereto are only intended to illustrate the idea of the invention. In its details the arrangement according to the invention may vary within the scope of the claims. Accordingly, it is possible to arrange the bearing studs in the rotation bushing as shown in FIG. 5. It is also possible to form the axial bearing in a backward element of the body similarly as in FIG. 5. When a direct driven shank is used, i.e. when the rotation cogging is formed directly on the shank, the cogging of the shank may strike against the axial bearing directly or indirectly.

I claim:

1. An arrangement for supporting an axial bearing of a drilling machine comprising:

a body supported by a carriage by a first supporting means,

a percussion means mounted in the body and a rotation means positioned on an axial extension of the percussion means for rotation of a shank, and

an axial bearing arranged in the body in an abutting relationship with said rotation means so that the

axial forces acting the rotation means through said shank are directly transferred from the rotation means to the axial bearing, and wherein the axial bearing is supported directly on the carriage in the axial direction, by a second supporting means separate from said first supporting means that supports the body radially, so that the axial forces received by the axial bearing are transferred to the carriage.

2. An arrangement according to claim 1, wherein the percussion means and the rotation means are mounted in separate body elements interconnected by means of tie rods, and wherein the axial bearing is formed by a separate part positioned between said body elements and provided with fastening lugs for fastening to the carriage.

3. An arrangement according to claim 2, wherein the carriage is provided with a support on which the fastening projections are supported in the axial direction by means of fastening bolts.

4. An arrangement according to claim 2, wherein the first supporting means is provided at opposite ends of the body between the body and the carriage for radial support of the body.

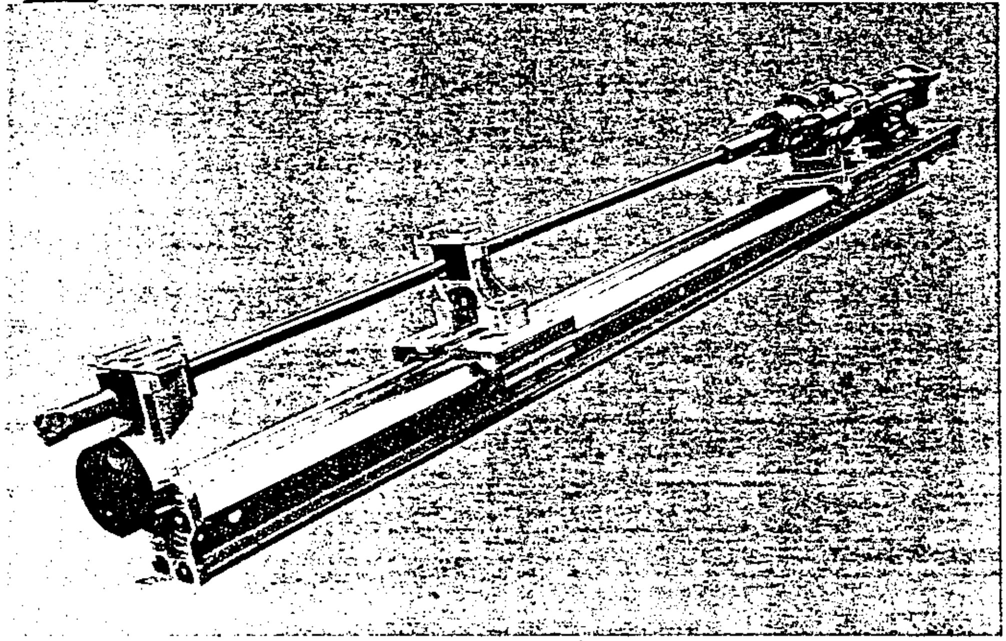
5. An arrangement according to claim 2, wherein the axial bearing is provided with bearing means positioned in the path of axial movement of a rotation bushing for the shank.

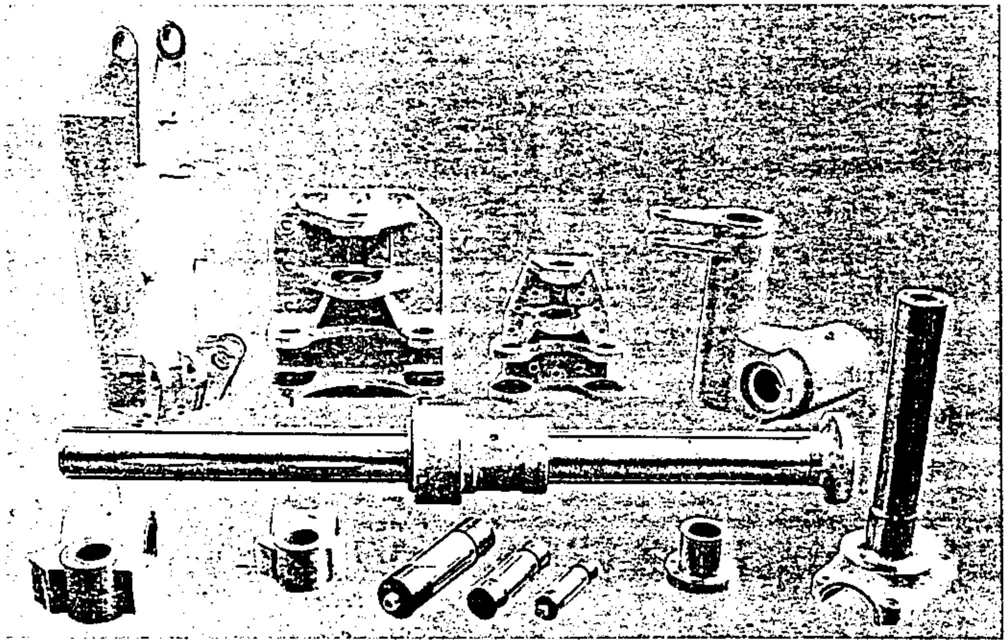
6. An arrangement according to claim 1, wherein the percussion means and the rotation means are mounted in separate body elements interconnected by means of tie rods, and wherein the axial bearing is formed in that end portion of one body element which faces the other body element and that said end portion is provided with fastening lugs for fastening to the carriage.

* * * * *

EXHIBIT B

SPARE PARTS FOR HIDRAULIC DRILLS AND JUMBOS





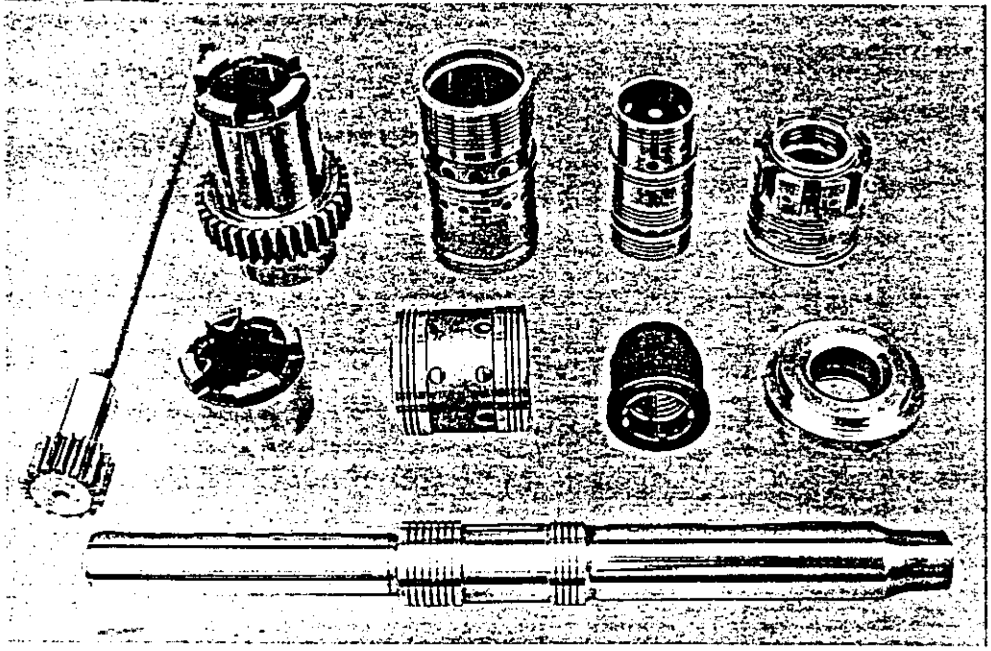
ATLAS COPCO FEED RAIL
Aluminium and steel feeds
BMH 1000 - Serie

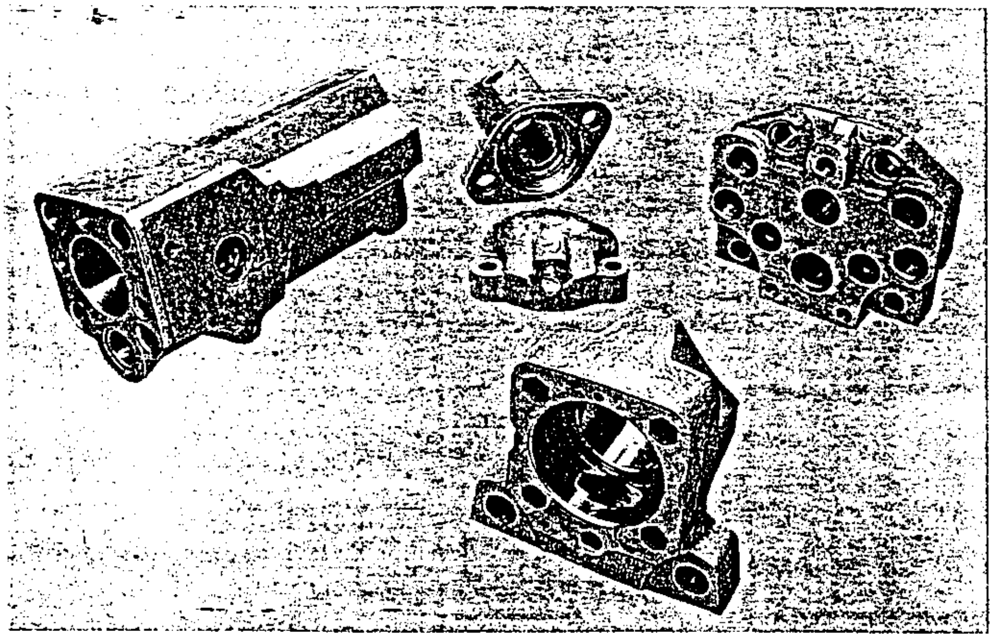
BOOM - BUT 25
Spare parts
OVERHAUL
BOOMS

We do not manufacture under licence, the makers and models are mentioned only as reference.

EQUIPOS MINEROS S. A.

SPARE PARTS FOR HIDRAULI(DRILLS AND JUMBOS





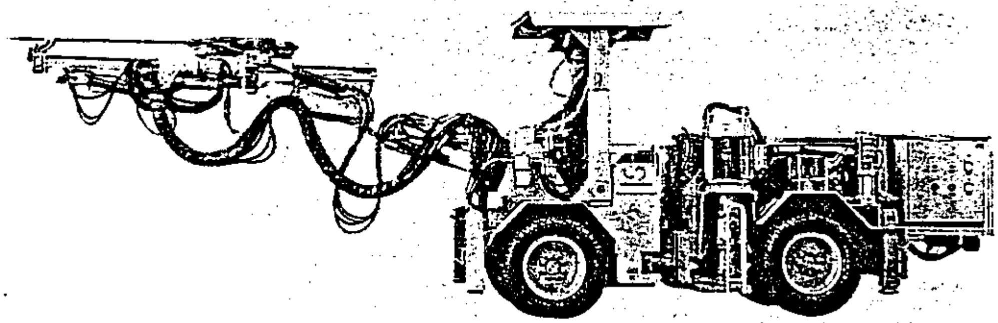
TAMROCK
HLR 438
HL 538
HL 500S
Other models are available on request.

OVERHAUL
REACONDITIONING OF:
* BODY CYLINDER
* COVER
* GEAR HOUSING

We do not manufacture under licence, the makers and models are mentioned only as reference.

EQUIPOS MINEROS S. A.

HYDRAULIC JUMBO



EM 25 HE FACE JUMBO

similar to:

Atlas Copco

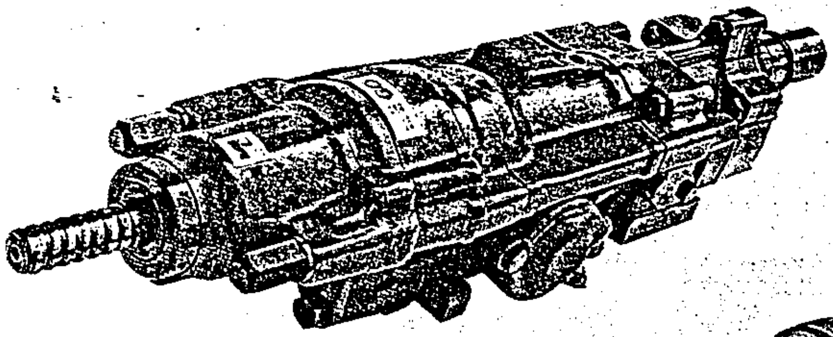
* Boomer H 251

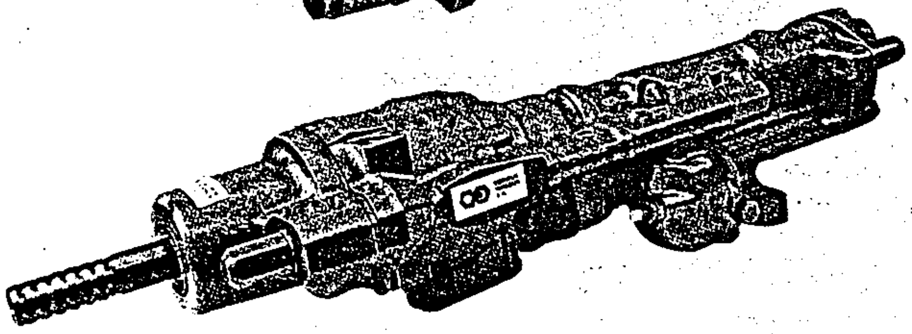
* Boltec H 126

Tamrock

* Monomatic

105D - 106D





Model EM 1238 and EM 1032

are full compatible with Atlas Copco Cop 1238 and Cop 1032

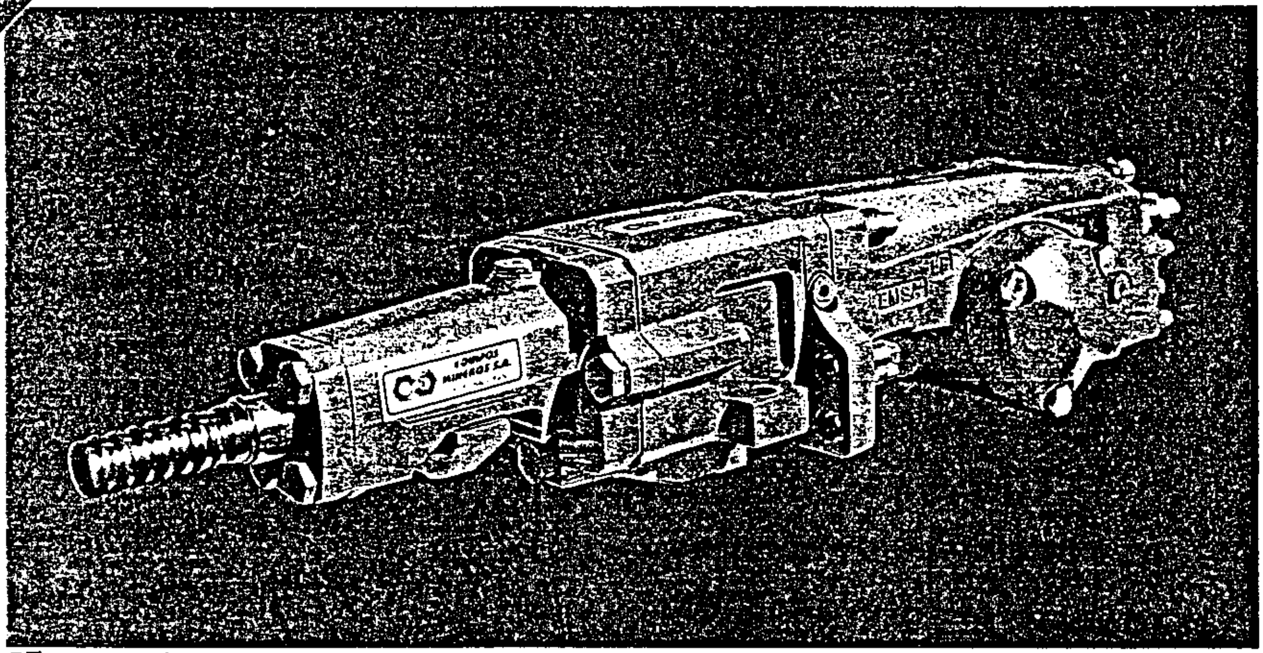
MADE IN CHILE

We do not manufacture under licence, the makers and models are mentioned only as reference.

EQUIPOS MINEROS S. A.

LAS VEGAS MINING SHOW 1999

HYDRAULIC ROCK DRILL
EM 500S



EM 500S is full compatible with Tamrock HL 500S

QUALITY : Similar to the other makers.
Give us the opportunity to prove our quality.

EXPERIENCE: 25 years of manufacturing spare parts for hydraulic and pneumatic drills.

A COST-EFFECTIVE ALTERNATIVE...

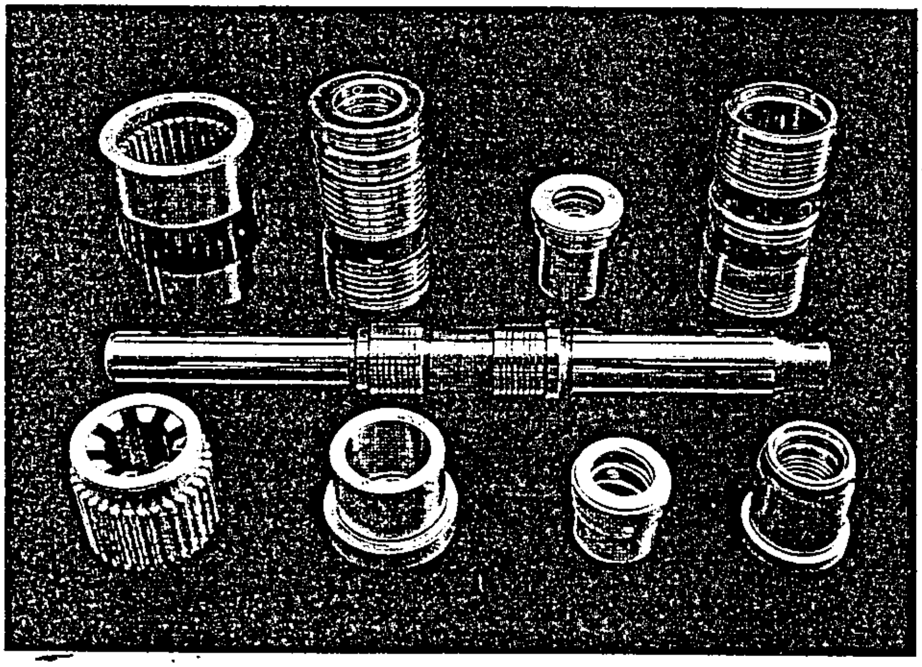
We do not manufacture under license, the makers and models are mentioned only as reference

EQUIPOS MINEROS S.A.

COLON 2005 VIVACETA P.O. BOX 1068 - SANTIAGO - CHILE TEL.: (56-2) 737 6412 - FAX: (56 - 2) 737 65

SPARE PARTS

WE HAVE THE BEST PRICE



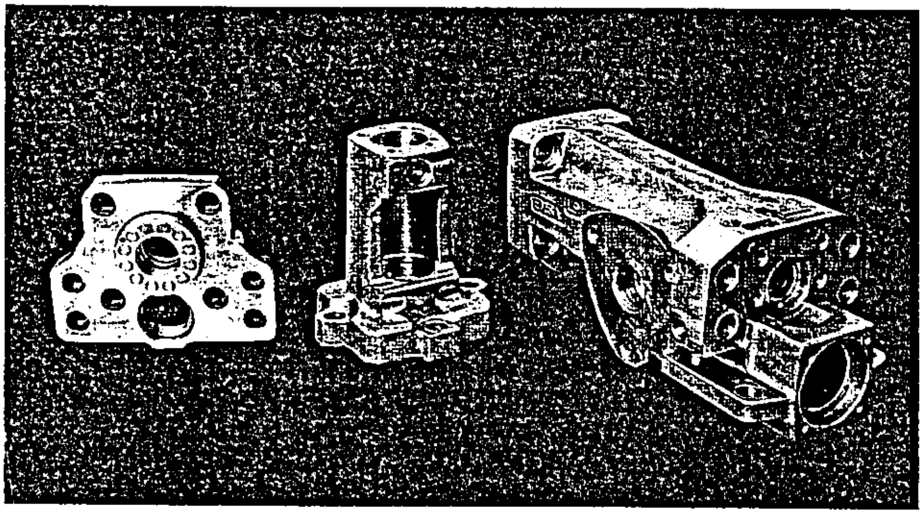
TAMROCK

HLR 438

HL 538

HL 500

HL 600



SPECIFICATIONS

	EM 500	EM 500S
Weight, Kg.	130	130
Lenght,mm	1000	1000
Profile height, mm	76	76
Power class,KW	16	16
Max. working pressure		
-percussion, bar	175	175
- rotation, bar	175	175
Max. torque, Nm	400/630	400
Hole size, mm.	51-89	43-51
Drill steels, mm.	32,38,45	32,35
Flushing pressure		
- air, bar	10	
- water, bar	10-20	

LOWER YOUR COSTS, NOT YOUR EXPECTATIONS...

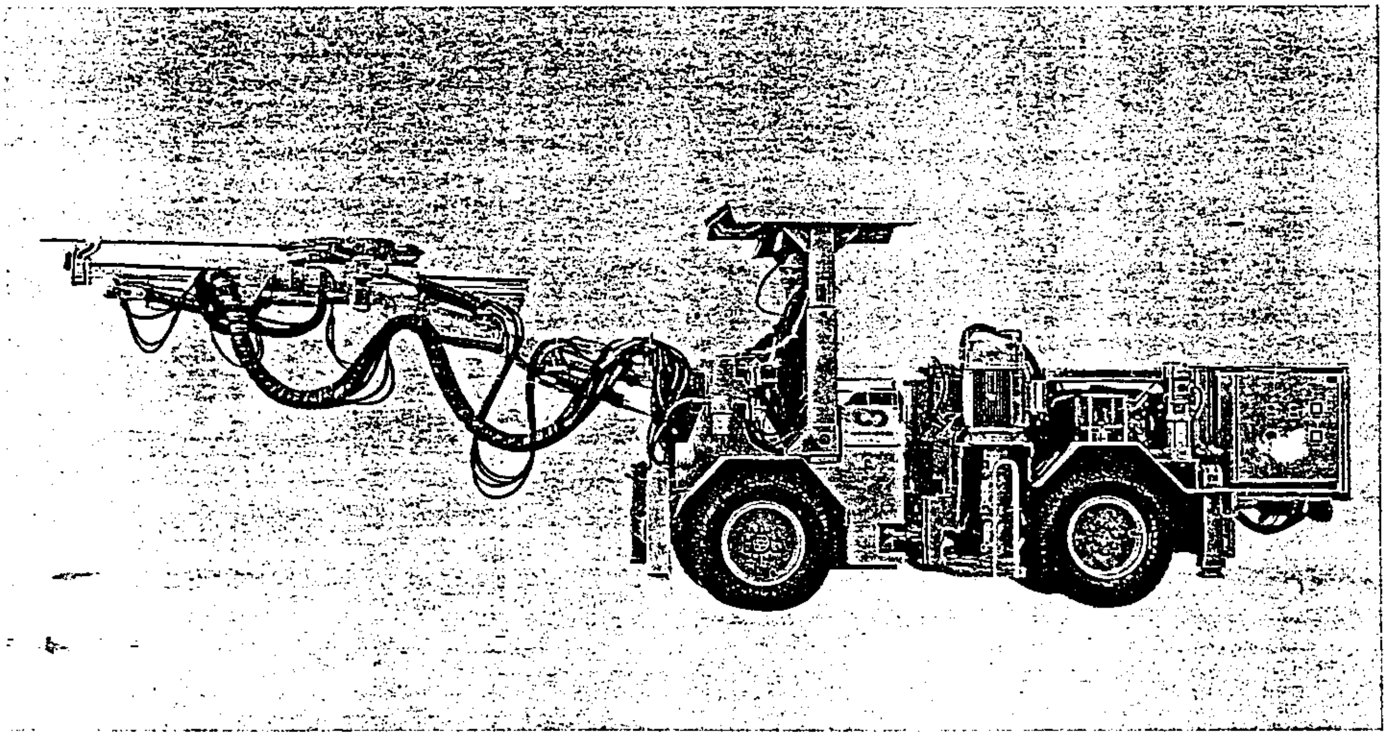
We do not manufacture under license, the makers and models are mentioned only as reference

EQUIPOS MINEROS S.A.

COLON 2005 VIVACETA P.O. BOX 1063 - SANTIAGO - CHILE; TEL.: (56-2) 737 6419 - FAX : (56 - 2) 737 951

JUMBO DRILL RIG

MODEL EM 25 HE



The Equipos Mineros model EM 25 HE is a diesel tram, electric-hydraulic drill pack self propelled wheel type hydraulically operated single Boom Jumbo - alternative two Booms. It is designed to drill: Drifting Holes, Cross Cut Holes, Bench Holes and Roof Holes. Manufactured in Chile by Equipos Mineros S.A., with a 20 years experience in manufacturing spare parts for drilling equipments - mining area.

SIMILAR TO:

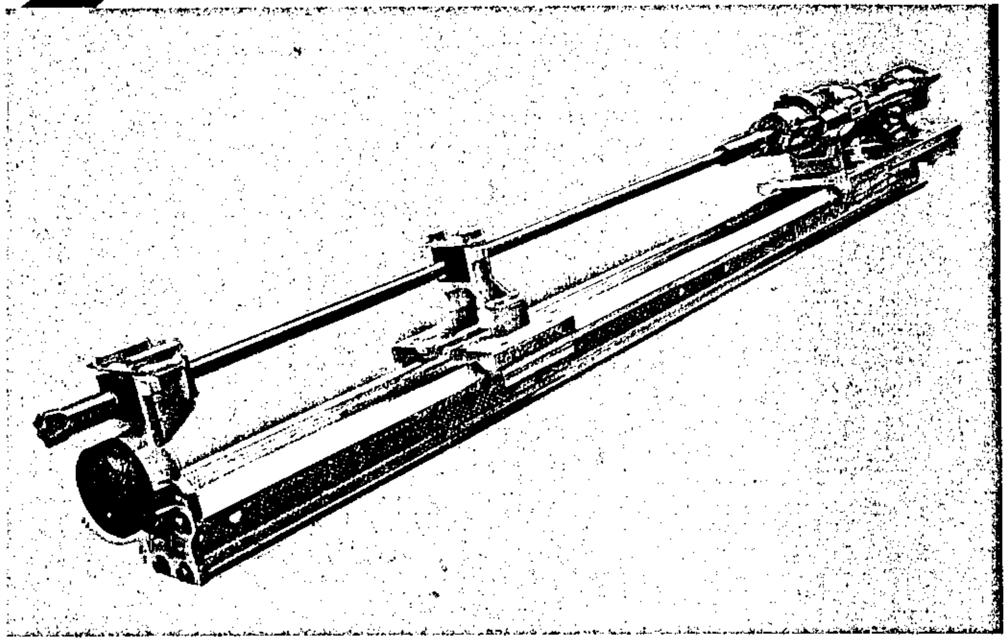
* BOOMER H251 - BOLTEC H126 - ATLAS COPCO
* MONOMATIC H107 - TAMROCK

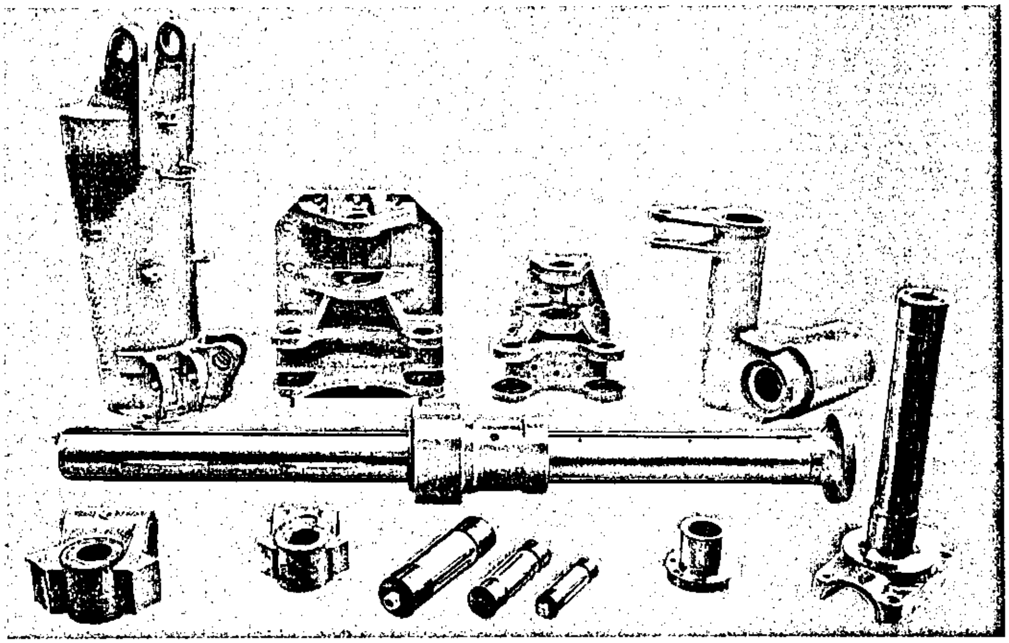
EQUIPOS MINEROS S. A.

COLON 2005 VIVACETA P.O. BOX 1063 · SANTIAGO - CHILE · TEL.: (56-2) 737 6419 · FAX: (56-2) 737 9518

EXHIBIT C

SPARE PARTS FOR HIDRAULIC DRILLS AND JUMBOS





ATLAS COPCO FEED RAIL

Aluminium
and steel feeds
BMH 1000 - Serie

BOOM - BUT 25

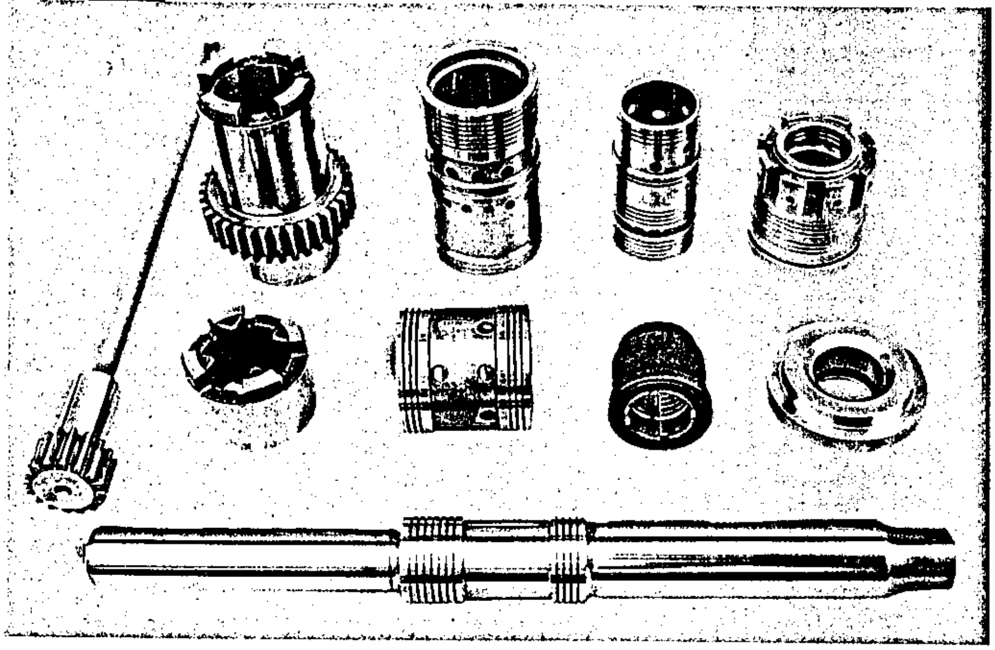
Spare parts
OVERHAUL
BOOMS

We do not manufacture under licence, the makers and models are mentioned only as reference.

EQUIPOS MINEROS S. A.

COLON 3005 - VIVACETA P.O. BOX 1063 - SANTIAGO - CHILE - TEL.: (56-2) 737 6410 - FAX: (56-2) 737 0518

SPARE PARTS FOR HIDRAULI(DRILLS AND JUMBOS



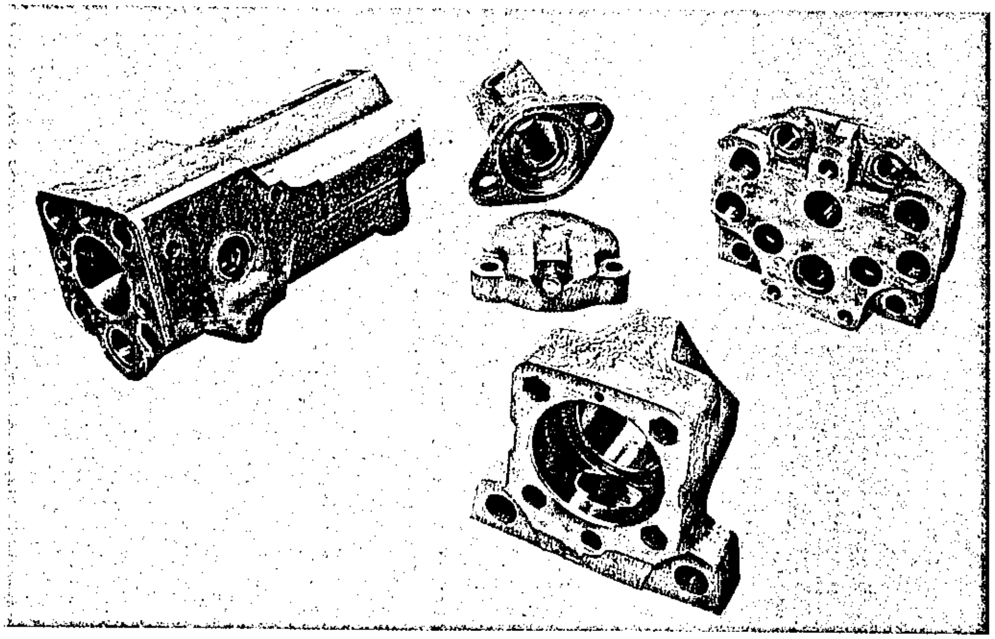
TAMROCK

HLR 438

HL 538

HL 500S

Other models are available on request.



OVERHAUL

REACONDITIONING OF:

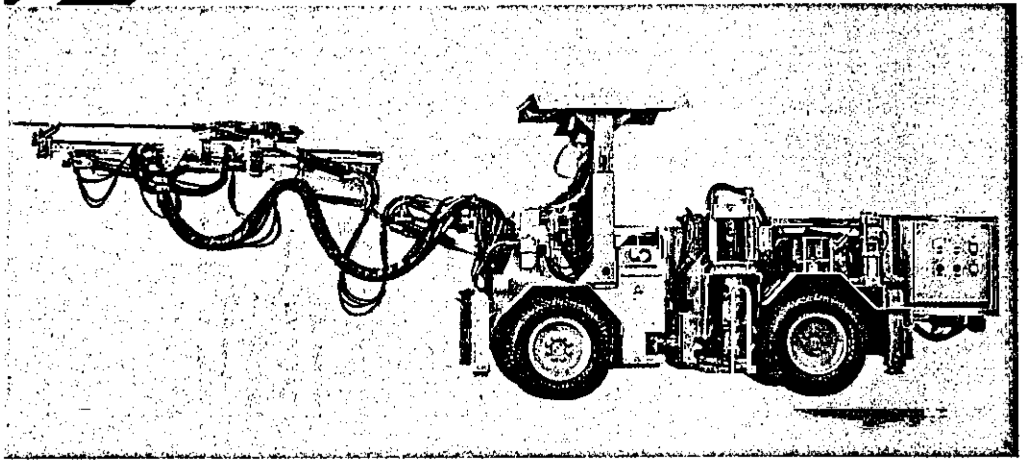
- **BODY CYLINDER**
- **COVER**
- **GEAR HOUSING**

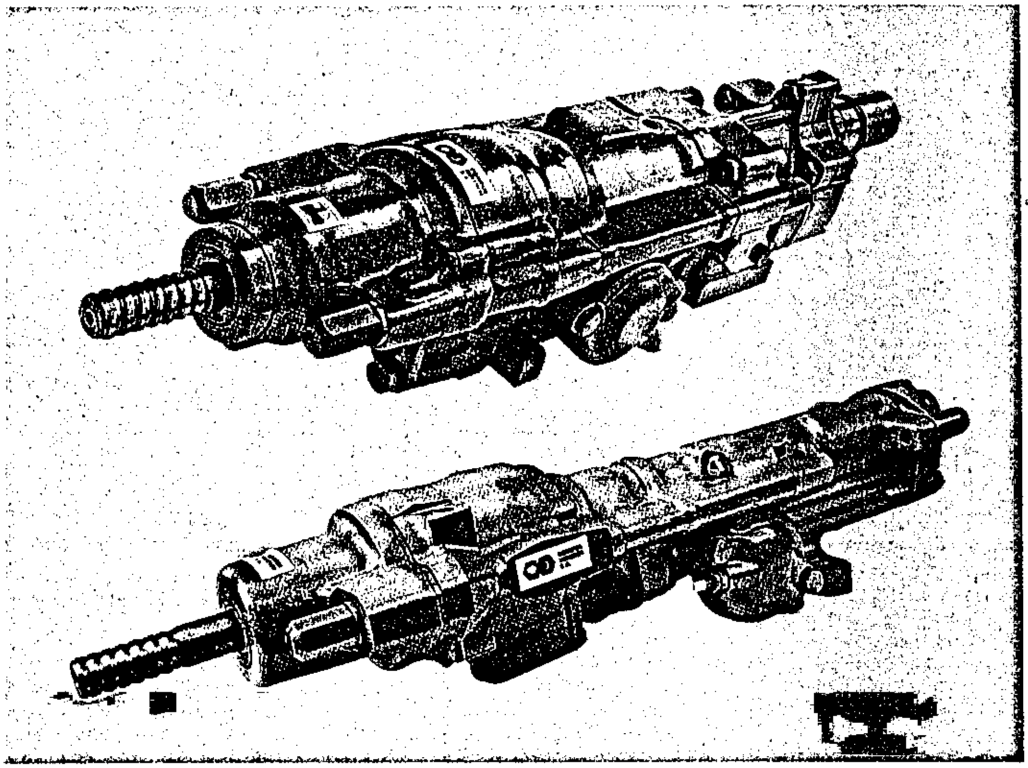
We do not manufacture under licence, the makers and models are mentioned only as reference.

EQUIPOS MINEROS S. A.

COLON 2005 VIVACETA P.O. BOX 1063 - SANTIAGO - CHILE - TEL.: (56-2) 737 6410 - FAX: (56-2) 737 0510

HYDRAULIC JUMBO





MADE IN CHILE

EM 25 HE FACE JUMBO

similar to:

Atlas Copco

* Boomer H 251
* Boltec H 126

Tamrock

* Monomatic

105D - 106D

Model EM 1238 and EM 1032

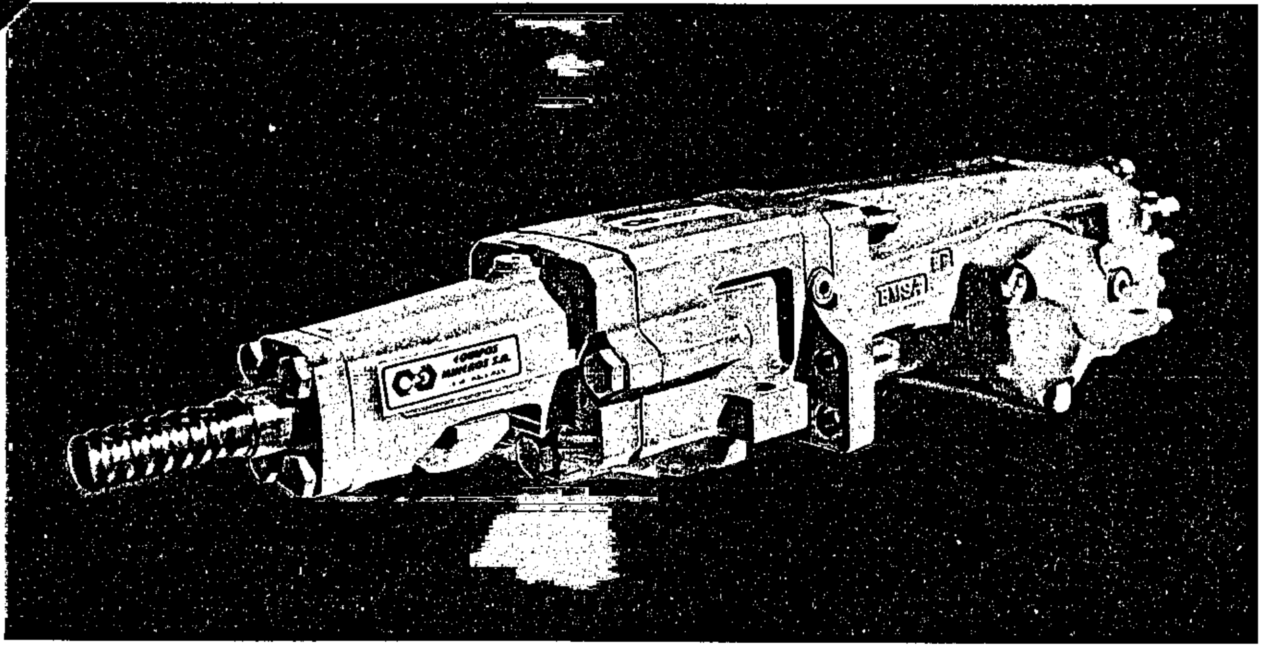
are full compatible with Atlas Copco Cop 1238 and Cop 1032

We do not manufacture under licence, the makers and models are mentioned only as reference.

EQUIPOS MINEROS S. A.

LAS VEGAS MINING SHOW 1999

HYDRAULIC ROCK DRILL
EM 500S



EM 500S is full compatible with Tamrock HL 500S

QUALITY : Similar to the other makers.
Give us the opportunity to prove our quality.

EXPERIENCE: 25 years of manufacturing spare parts for hydraulic and pneumatic drills.

A COST-EFFECTIVE ALTERNATIVE...

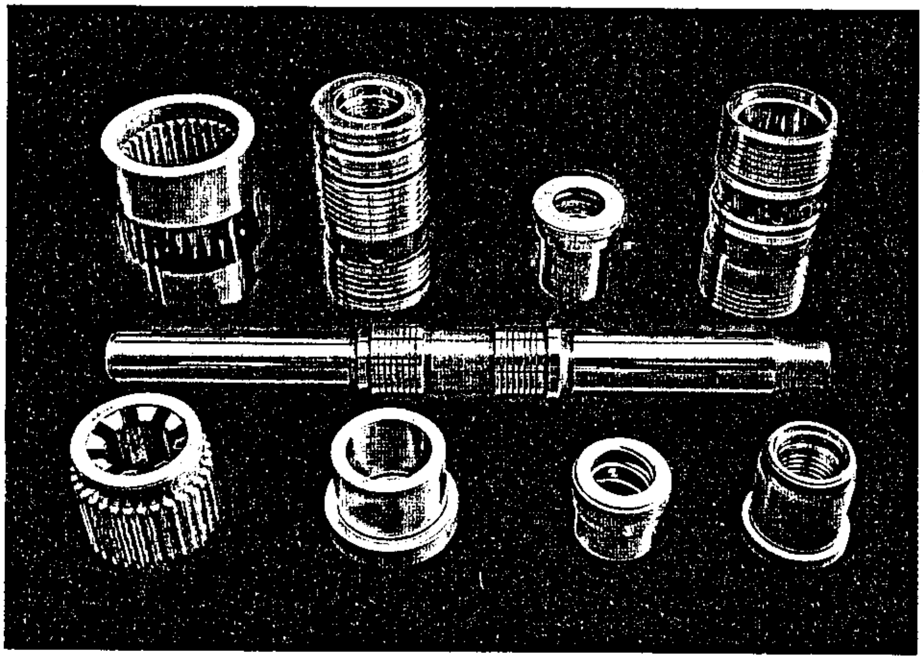
We do not manufacture under license, the makers and models are mentioned only as reference

EQUIPOS MINEROS S.A.

COLON 2005 VIVACETA P.O. BOX 1063 · SANTIAGO · CHILE: TEL.: (56-2) 737 6419 - FAX : (56 - 2) 737 951

SPARE PARTS

WE HAVE THE BEST PRICE



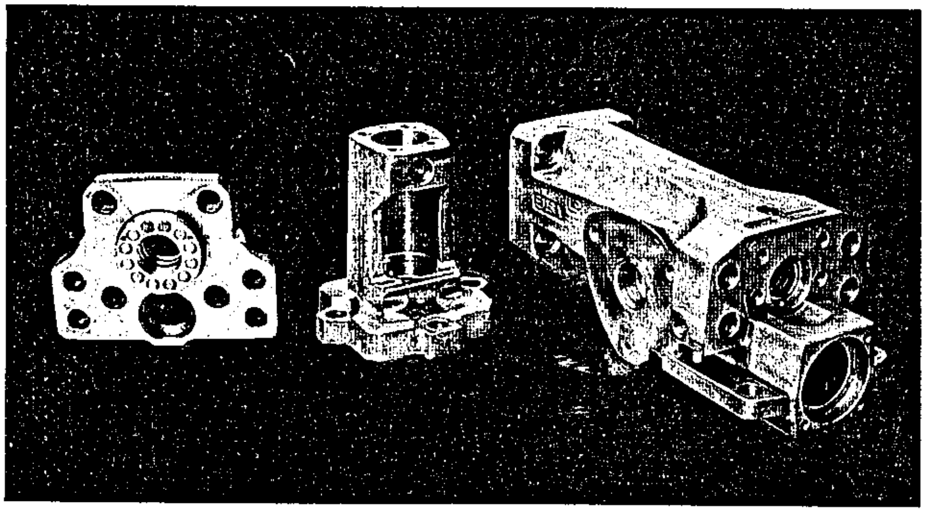
TAMROCK

HLR 438

HL 538

HL 500

HL 600



SPECIFICATIONS

	EM 500	EM 500S
Weight, Kg.	130	130
Lenght,mm	1000	1000
Profile height, mm	76	76
Power class,KW	16	16
Max. working pressure		
-percussion, bar	175	175
- rotation, bar	175	175
Max. torque, Nm	400/630	400
Hole size, mm.	51-89	43-51
Drill steels, mm.	32,38,45	32,35
Flushing pressure		
- air, bar	10	
- water, bar	10-20	

LOWER YOUR COSTS, NOT YOUR EXPECTATIONS...

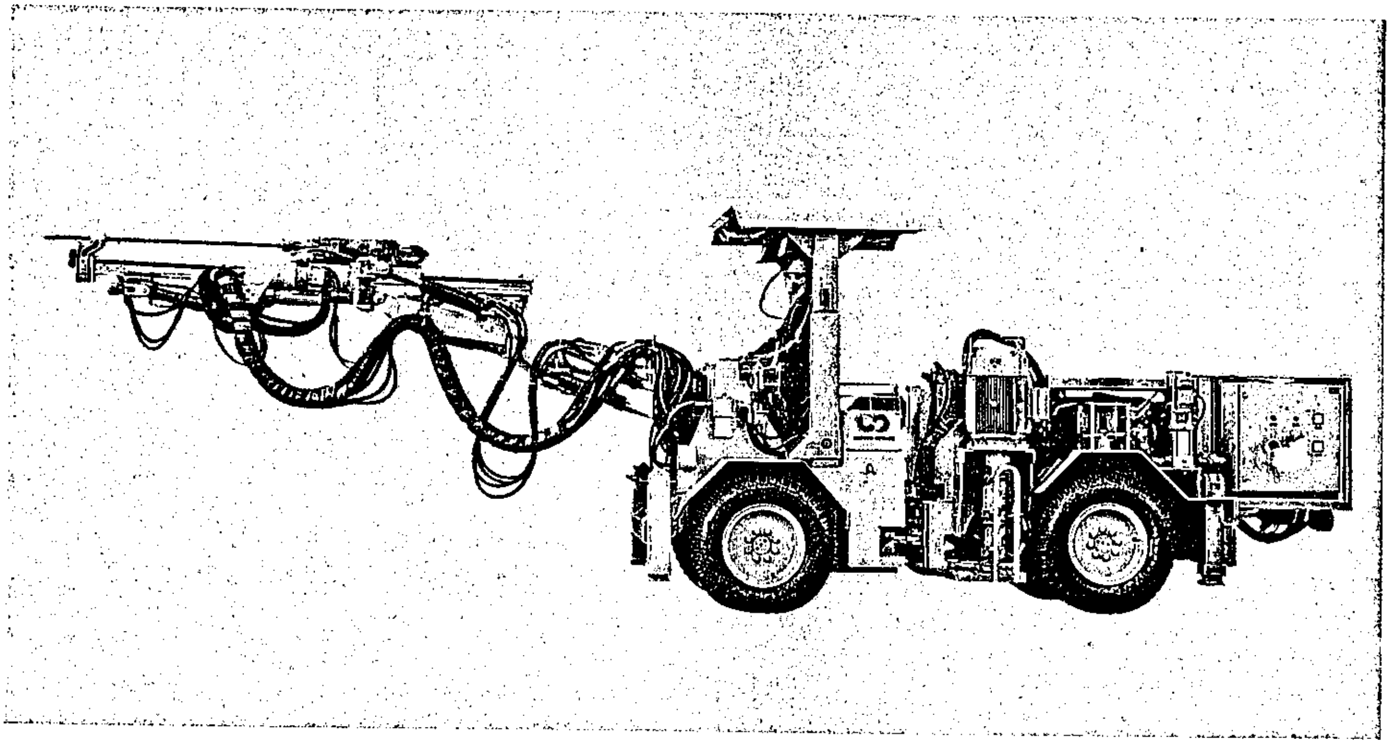
We do not manufacture under license, the makers and models are mentioned only as reference

EQUIPOS MINEROS S.A.

COLON 2005 VIVACETA P.O. BOX 1063 · SANTIAGO · CHILE: TEL.: (56-2) 737 6419 - FAX : (56 - 2) 737 951

JUMBO DRILL RIG

MODEL EM 25 HE



The Equipos Mineros model EM 25 HE is a diesel tram, electric-hydraulic drill pack self propelled wheel type hydraulically operated single Boom Jumbo - alternative two Booms. It is designed to drill: Drifting Holes, Cross Cut Holes, Bench Holes and Roof Holes. Manufactured in Chile by Equipos Mineros S.A., with a 20 years experience in manufacturing spare parts for drilling equipments - mining area.

SIMILAR TO:

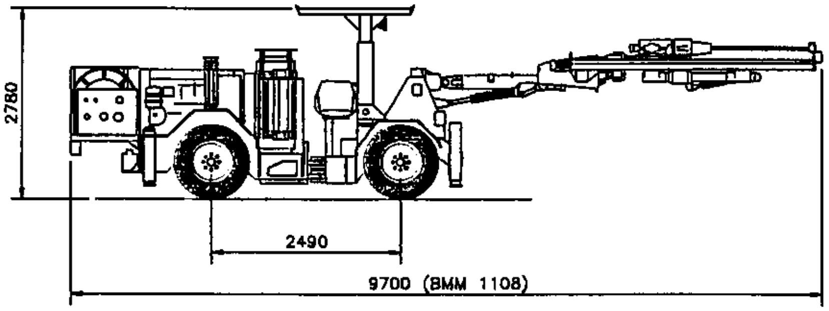
* BOOMER H251 - BOLTEC H126 - ATLAS COPCO
* MONOMATIC H107 - TAMROCK

EQUIPOS MINEROS S. A.

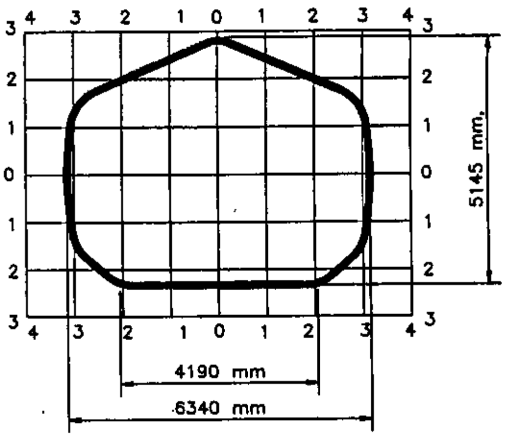
COLON 2005 VIVACETA P.O. BOX 1063 · SANTIAGO - CHILE · TEL.: (56-2) 737 6419 · FAX: (56-2) 737 9518

TECHNICAL INFORMATION

DIMENSIONS



BOOM COVERAGE

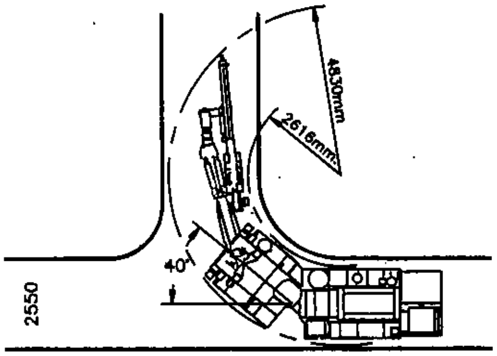


COMPONENTS:

CARRIER	: Getman 440
ENGINE	: Deutz F4L 912W
TRANSMISSION	: Powershift
TIRES	: 9.00 X 20-12 PR
LEVELING JACKS	
BOOMS (one) or (two)	: EM BUT 25, vertical and horizontal parallelism
FEED ALTERNATIVES	: EM BMH 1100 EM BMH 1300
DRILL ALTERNATIVES	: EM 1032 EM 1238
WEIGHT, kg (lb)	: 10500 (23100)
POWER REQUIREMENTS	
ELECTRIC, KW	: EM 1032, 35 KW EM 1238, 50 KW
VOLTAGES	: 380V, 440V, 575V.

MANEUVERABILITY

TURNING RADIUS



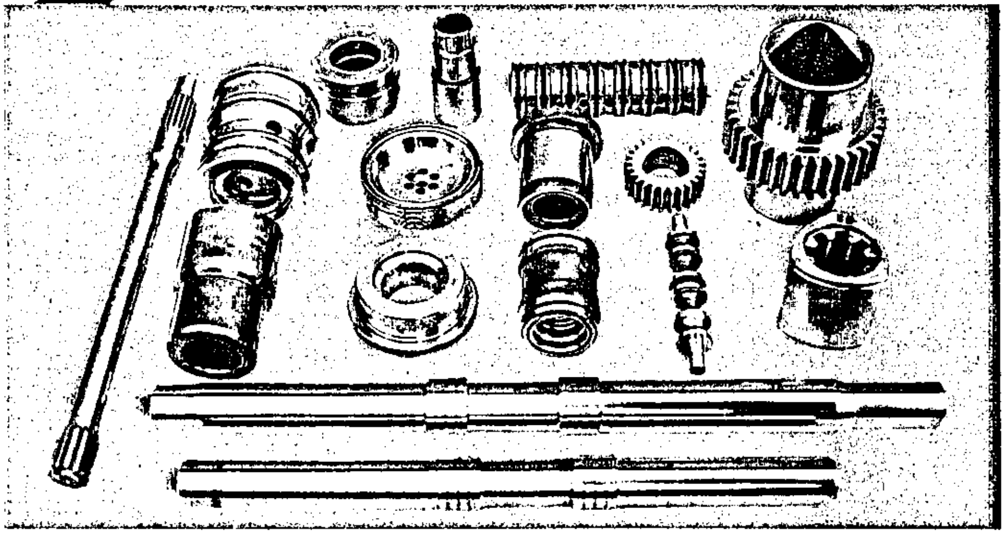
SPEED 2,7 mp/h (3,9 km/h)
GRADEABILITY 35 %

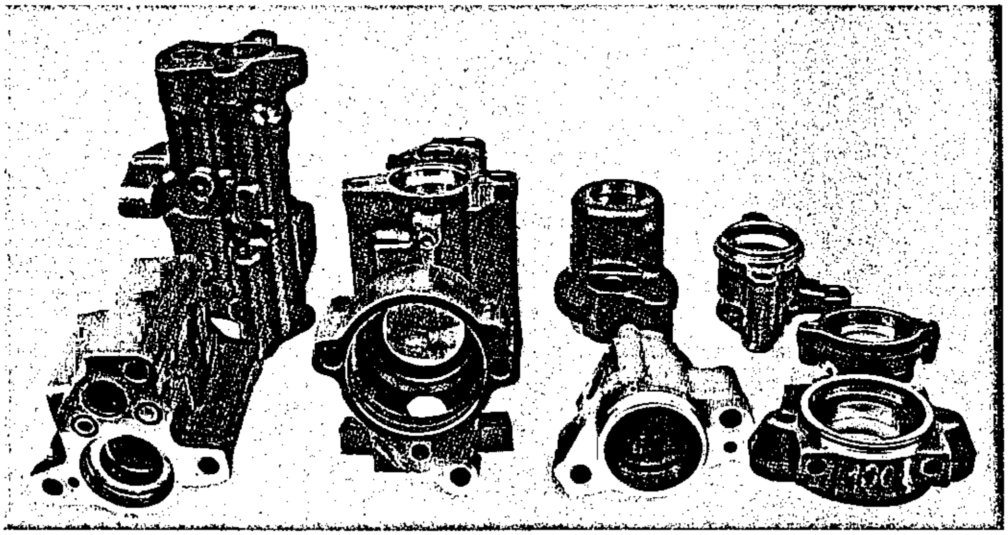
The manufacturer and models are mentioned only as reference

EQUIPOS MINEROS S. A.

COLON 2005 VIVACETA P.O. BOX 1063 · SANTIAGO - CHILE · TEL.: (56-2) 737 6419 · FAX: (56-2) 737 9518

SPARE PARTS FOR HYDRAULIC ROCK DRILLS AND JUMBOS





ATLAS COPCO

COP 1238

COP 1032

OVERHAUL

REACONDITIONING OF:

* INTERMEDIATE PART
* FRONT HEAD
* GEAR HOUSING
* CYLINDER
* COVER

Equipos Mineros S.A. manufactures spare parts for Atlas Copco, Tamrock and other makers of Hydraulic rock dril

Experience : 20 years of manufacturing spare parts for hydraulic and pneumatic rock drills and Jumbos's components.

Warranty : Same footage as other drills.

We do not manufacture under licence, the makers and models are mentioned only as reference.

EQUIPOS MINEROS S. A.

EXHIBIT D

The United States of America

№ 935320

CERTIFICATE OF RENEWAL

This is to certify that the records of the Patent and Trademark Office show that an application was filed in said Office for renewal of registration of the Mark shown herein, a copy of said Mark and pertinent data from the Registration being annexed hereto and made a part hereof,

And there having been due compliance with the requirements of the law and with the regulations prescribed by the Commissioner of Patents and Trademarks,

Upon examination, it appeared that the applicant was entitled to have said Registration renewed under the Trademark Act of 1946, as amended, and said Registration has been duly renewed in the Patent and Trademark Office to the registrant named herein.

This Registration shall remain in force for TEN years from the date that said Registration was due to expire unless sooner terminated as provided by law.

In Testimony Whereof I have hereunto set my hand and caused the seal of the Patent and Trademark Office to be affixed this eleventh day of August 1992.

Acting Commissioner of Patents and Trademarks

Int. Cl.: 7

Prior U.S. Cl.: 23

United States Patent and Trademark Office

10 Year Renewal

Reg. No. 935,320
Registered June 6, 1972
Renewal Term Begins June 6, 1992

TRADEMARK
PRINCIPAL REGISTER

TAMROCK

OY TAMPELLA AB (FINLAND CORPORATION)
LAPINTIE 1
TAMPERE, FINLAND SF-33100

FOR: ROCK DRILLING MACHINES AND PARTS THEREOF, IN CLASS 23 (INT. CL. 7).
FIRST USE 1-0-1969; IN COMMERCE 1-0-1969.

SER. NO. 72-376,292, FILED 11-16-1970.

In testimony whereof I have hereunto set my hand and caused the seal of The Patent and Trademark Office to be affixed on Aug. 11, 1992.

COMMISSIONER OF PATENTS AND TRADEMARKS

UNITED STATES DEPARTMENT OF COMMERCE
Patent and Trademark Office
ASSISTANT SECRETARY AND COMMISSIONER
OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

REGISTRATION NO. 0935320 SERIAL NO. 72/376292 PAPER NO.
MAILING DATE: 07/06/92

MARK: TAMROCK

REGISTRANT: OY TAMPELLA AB

CORRESPONDENCE ADDRESS:
LLOYD MCAULEY
MCAULAY FISHER NISSEN GOLDBERG & KIEL
261 MADISON AVENUE
NEW YORK, NY 10016

Please furnish the following in all correspondence:

1. Your phone number and zip code.
2. Mailing date of this action.
3. Affidavit-Renewal Examiner's name.
4. The address of all correspondence not containing fees should include the words "Box 5".
5. Registration No.

RECEIPT IS ACKNOWLEDGED OF THE SUBMITTED REQUEST UNDER:

SECTION 9 OF THE TRADEMARK ACT AND 37 CFR SECS. 2.181-2.184.

YOUR REQUEST FULFILLS THE STATUTORY REQUIREMENTS AND RENEWAL HAS BEEN GRANTED.

M. E. Bowman

MARY E. BOWMAN
AFFIDAVIT-RENEWAL EXAMINER
TRADEMARK EXAMINING OPERATION
(703) 308-9500 EXT. 36

DOCKET
DUE Dec. 1, 1992

Receipt of Certificate

RECEIVED
9 1992
McAULAY FISHER NISSEN GOLDBERG & KIEL

18804 US

Nº 935320

THE UNITED STATES OF AMERICA

This is to certify that from the records of the Patent Office it appears that an application was filed in said Office for registration of the Mark shown herein, a copy of said Mark and pertinent data from the Application being annexed hereto and made a part hereof,

And there having been due compliance with the requirements of the law and with the regulations prescribed by the Commissioner of Patents,

Upon examination, it appeared that the applicant was entitled to have said Mark registered under the Trademark Act of 1946, and the said Mark has been duly registered this day in the Patent Office on the

PRINCIPAL REGISTER

to the registrant named herein.

This registration shall remain in force for Twenty Years unless sooner terminated as provided by law.

In Testimony Whereof I have hereunto set my hand and caused the seal of the Patent Office to be affixed this sixth day of June, 1972.

COMMISSIONER OF PATENTS

United States Patent Office

935,320
Registered June 6, 1972

PRINCIPAL REGISTER
Trademark

Ser. No. 376,292, filed Nov. 16, 1970

TAMROCK

Oy Tampella AB (Finnish corporation)
Tampere, Finland

For: ROCK DRILLING MACHINES AND PARTS THEREOF, in CLASS 23 (INT. CL. 7).
First use January 1969; in commerce January 1969.

G. R. LEADER, Examiner